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**United States Patent** [19][11] Patent Number: **5,384,775****Sheppard**[45] Date of Patent: **Jan. 24, 1995****[54] APPARATUS FOR, AND METHOD OF, PACKING AND UNPACKING INFORMATION IN TRANSMISSION LINES****[75] Inventor:** Thomas C. Sheppard, Simi Valley, Calif.**[73] Assignee:** Micom Communications Corp., Simi Valley, Calif.**[21] Appl. No.:** 164,057**[22] Filed:** Dec. 8, 1993**Related U.S. Application Data****[63]** Continuation of Ser. No. 645,211, Jan. 24, 1991, Pat. No. 5,291,487.**[51] Int. Cl.<sup>6</sup>** ..... H04J 3/16**[52] U.S. Cl.** ..... 370/84; 370/85.6; 370/85.7; 370/99**[58] Field of Search** ..... 370/41, 43, 46, 79, 370/80, 82, 83, 84, 85.6, 85.7, 91, 94.2, 99, 118, 95.1; 341/61, 62, 84, 85, 178**[56] References Cited****U.S. PATENT DOCUMENTS**

4,074,074	2/1978	Boutmy et al.	370/118
4,494,232	1/1985	Dambrackas	370/80
4,581,737	4/1986	Sparrell	370/118
4,987,571	1/1991	Haymond et al.	370/85.6
5,132,966	7/1992	Hayano et al.	370/79
5,150,358	9/1992	Punj et al.	370/85.6

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Symbols, each having a particular number (e.g. 9) of binary bits in first channels have individual periodicities. A symbol in each channel indicates the start and the periodicity of the symbols in that channel. Another symbol indicates the end of the symbols in that channel. The symbols from each channel are merged into sequential time slots, in a priority dependent upon the symbol periodicities in the different channels. Aperiodic symbols in second channels are merged sequentially into the time slots not occupied by the periodic symbols. Second portions (e.g. 5 bits) of the symbols in groups are provided in character frames without change. The binary bits (e.g. 4) in the first portion of each symbol in each group represent a decimal integer. The resultant decimal value is represented in the character frame by a reduced number (e.g. 10) of binary bits. After transmission, the reduced number of binary bits are converted at a receiver to binary bits representing each decimal integer in the resultant decimal value. The converted bits for each symbol are combined with the bits in the second portion of the symbol to restore the symbol. The time slots for the periodic symbols of each individual periodicity are determined from the start symbol and the periodicity of such symbols. The symbols in the time slots of each individual periodicity are introduced to a separate channel. The aperiodic symbols are introduced to an additional channel.

**13 Claims, 7 Drawing Sheets**